

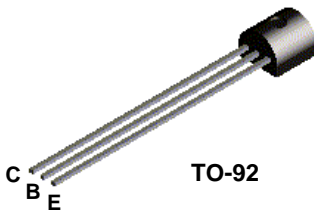


Discrete POWER & Signal  
Technologies

2N7052

2N7053

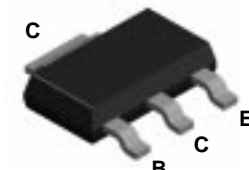
NZT7053



TO-92



TO-226



SOT-223

NPN Darlington Transistor

This device is designed for applications requiring extremely high gain at collector currents to 1.0 A and high breakdown voltage. Sourced from Process 06.

Absolute Maximum Ratings\*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>CEO</sub>	Collector-Emitter Voltage	100	V
V <sub>CBO</sub>	Collector-Base Voltage	100	V
V <sub>EBO</sub>	Emitter-Base Voltage	12	V
I <sub>C</sub>	Collector Current - Continuous	1.5	A
T <sub>J</sub> , T <sub>stg</sub>	Operating and Storage Junction Temperature Range	-55 to +150	°C

\*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics

TA = 25°C unless otherwise noted

Symbol	Characteristic	Max			Units
		2N7052	2N7053	*NZT7053	
P <sub>D</sub>	Total Device Dissipation Derate above 25°C	625 5.0	1,000 8.0	1,000 8.0	mW mW/°C
R <sub>θJC</sub>	Thermal Resistance, Junction to Case	83.3	125		°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	200	50	125	°C/W

\* Device mounted on FR-4 PCB 36 mm X 18 mm X 1.5 mm; mounting pad for the collector lead min. 6 cm<sup>2</sup>.

NPN Darlington Transistor  
(continued)

Electrical Characteristics TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
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OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	$I_C = 1.0\text{ mA}, I_B = 0$	100		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	$I_C = 100\text{ }\mu\text{A}, I_E = 0$	100		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	$I_E = 1.0\text{ mA}, I_C = 0$	12		V
$I_{CBO}$	Collector-Cutoff Current	$V_{CB} = 80\text{ V}, I_E = 0$		0.1	$\mu\text{A}$
$I_{CES}$	Collector-Cutoff Current	$V_{CE} = 80\text{ V}, I_E = 0$		0.2	$\mu\text{A}$
$I_{EBO}$	Emitter-Cutoff Current	$V_{EB} = 7.0\text{ V}, I_C = 0$		0.1	$\mu\text{A}$

ON CHARACTERISTICS\*

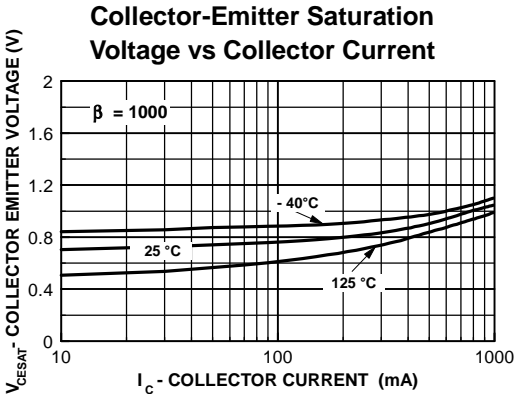
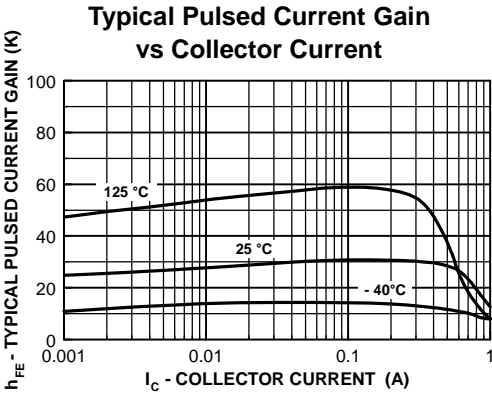
$h_{FE}$	DC Current Gain	$I_C = 100\text{ mA}, V_{CE} = 5.0\text{ V}$ $I_C = 1.0\text{ A}, V_{CE} = 5.0\text{ V}$	10,000 1,000	20,000	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 100\text{ mA}, I_B = 0.1\text{ mA}$		1.5	V
$V_{BE(on)}$	Base-Emitter On Voltage	$I_C = 100\text{ mA}, V_{BE} = 5.0\text{ V}$		2.0	V

SMALL SIGNAL CHARACTERISTICS

$F_T$	Transition Frequency	$I_C = 100\text{ mA}, V_{CE} = 5.0\text{ V},$	200		MHz
$C_{cb}$	Collector-Base Capacitance	$V_{CB} = 10\text{ V}, f = 1.0\text{ MHz}$ <b>2N7052</b> <b>2N7053</b>		10 8.0	pF

\*Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 1.0\%$

Typical Characteristics

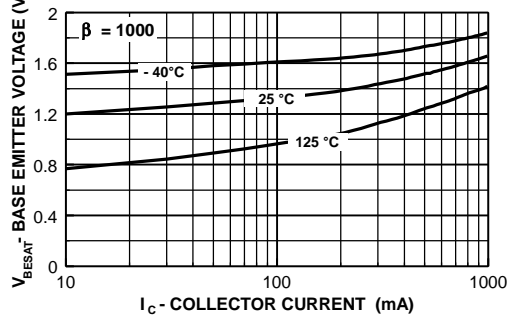


# NPN Darlington Transistor (continued)

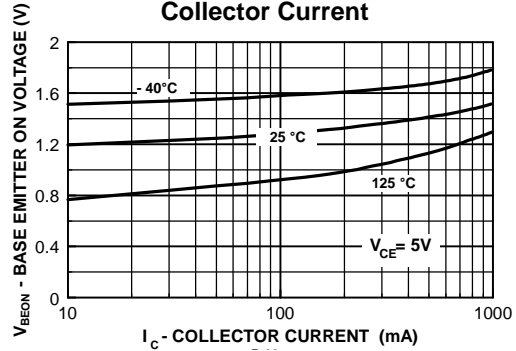
2N7052 / 2N7053 / NZT7053

## Typical Characteristics (continued)

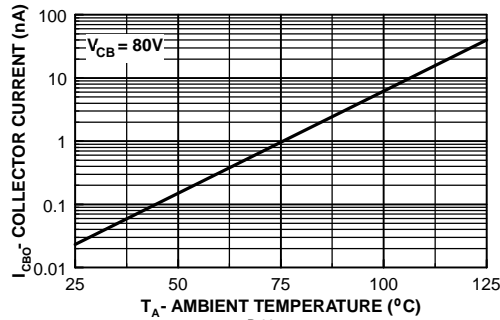
**Base-Emitter Saturation Voltage vs Collector Current**



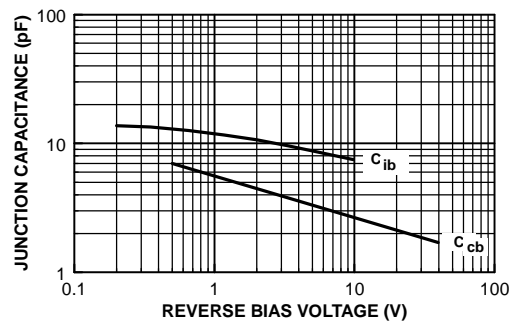
**Base Emitter ON Voltage vs Collector Current**



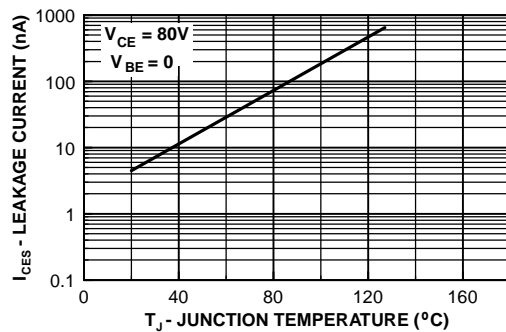
**Collector-Cutoff Current vs. Ambient Temperature**



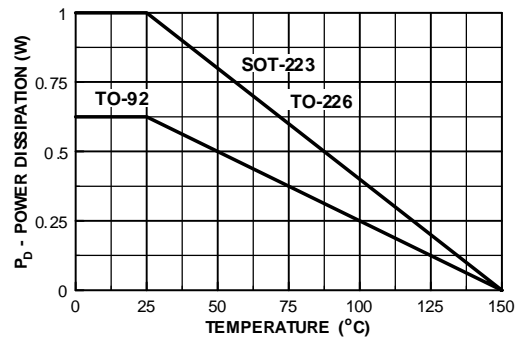
**Junction Capacitance vs Reverse Bias Voltage**



**Typical Collector-Emitter Leakage Current vs Temperature**



**Power Dissipation vs Ambient Temperature**



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